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Tech Talk: Db2 Warehouse & Integrated Analytics System (IIAS)

Migration from PureData System for Analytics (PDA)
to Db2 Warehouse & IIAS

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Migration from PDA to Db2 Warehouse & IIAS



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PDA to Db2 warehouse and IIAS is Highly Compatible

- main tools to use
 - db_migrate
 - Database Harmony Profiler (datastage)
- datatype
- BNR
- CLI
- Driver
- hist/WLM
- Config
- INZA
- SQL



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Data Types

There are many compatible data type across PDA to Db2 Warehouse below are the that are non-compatable:

NETEZZA DATA TYPES	Db2 DATA TYPES ALT
BOOL	<p>Use one of the following approaches:</p> <ul style="list-style-type: none">• Use the built-in BOOLEAN type. IBM® Database Harmony Profiler automatically converts BOOL to BOOLEAN.• Create a type by using the CREATE TYPE (distinct) statement, as follows:CREATE TYPE BOOL AS BOOLEAN WITH WEAK TYPE RULES
BYTEINT (alias INT1)	<p>Use one of the following approaches:</p> <ul style="list-style-type: none">• Use the built-in SMALLINT (SHORT) type. IBM Database Harmony Profiler automatically converts BYTEINT to SMALLINT.• Create a type by using the CREATE TYPE (distinct) statement, as follows:CREATE TYPE BYTEINT AS SMALLINT WITH WEAK TYPE RULES <p>Test your queries to ensure that the data type change does not affect results.</p>



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Data Types

There are many compatible data type across PDA to Db2 Warehouse below are the that are non-compatible:

NETEZZA DATA TYPES	Db2 DATA TYPES ALT
INTERVAL (alias TIMESPAN)	Consider using the DECIMAL data type to store appropriate date, time, and time stamp duration values. Alternatively, replace the INTERVAL data type with the INTEGER or BIGINT data type, and store the value in units of seconds. Additional work is required to convert the INTEGER value to days, minutes, seconds, etc.
TIME WITH TIMEZONE (alias TIMETZ)	Store time zone information in a new separate column of the table. You can use an additional column to store the time zone component and include the value of this column in all time calculations. Alternatively, you can keep the database server on Coordinated Universal Time (UTC) and convert all time-zoned values to UTC.



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Data Types

Some non-internal data types that are supported in both PDA and Db2 Warehouse products are supported differently.

NETEZZA DATA TYPES	Db2 DATA TYPES DIFF
CHAR	The maximum length for the Db2 data type is 255 bytes. The maximum length for the Netezza data type is 64,000 bytes.
VARCHAR	The maximum length for the Db2 data type is 32,592 bytes. The maximum length for the Netezza data type is 64,000 bytes.
NCHAR	The maximum length for the Db2 data type is 63 bytes. The maximum length for the Netezza data type is 16,000 bytes.
NVARCHAR	The maximum length for the Db2 data type is 8148 bytes. The maximum length for the Netezza data type is 16,000 bytes.
VARBINARY	The maximum length for the Db2 data type is 32,592 bytes. The maximum length for the Netezza VARBINARY and ST_GEOMETRY data types is 64,000 bytes.



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Data Types

Netezza internal data types, such as ROWID, are supported differently or are unsupported in Db2.

NETEZZA DATA TYPES	Db2 SUPPORT
ROWID	You can use the ROWID pseudocolumn, which has a VARCHAR (16) FOR BIT DATA data type. ROWID is an alternative to the RID_BIT() function.
DATASLICE	You can use the DATASLICEID pseudocolumn. This column contains the database partition number for a row. The value can be 0.
TRANSACTION ID	If required, you can use an identity column (hidden, if need be) in your table to provide a unique row identifier.



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- BNR:

You cannot use an PureData System for Analytics (Netezza) backup to restore to a Db2 database.

- DRIVERS:

The driver package for the Db2 instance contains multiple drivers that you can use to connect client applications to the Db2 database. The package includes drivers for ODBC, JDBC, .NET, and OLE DB. You can also connect programmatically by using ODBC, JDBC, or .NET. For information about connecting an application to a Db2 database, see [Connecting to your Db2 database](#).

- CLI:

Most PureData System for Analytics (Netezza) CLI commands (nz* commands) do not have corresponding Db2 commands. In some cases, there's a different mechanism. In other cases, no equivalent is necessary.

NETEZZA CLI COMMAND	Db2 SUPPORT
nzconvert, nzhw, nzspupart, nzds, nzhistcleanupdb, nzhistcreatedb	No Db2 equivalent
	Db2 monitoring



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- CLI:

Most PureData System for Analytics (Netezza) CLI commands (nz* commands) do not have corresponding Db2 commands. In some cases, there's a different mechanism. In other cases, no equivalent is necessary.

NETEZZA CLI COMMAND	Db2 SUPPORT
Nzpassword, nzrev, nzsession, nzstate, nzstats, nzsystem, nzevent	Db2 Web consoles
Nzstart, nzstop, nzrestore, nzhostrestore, nzhostbackup	Db2 monitoring/managed



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Configuration:

Multiple schemas

If you configured your Netezza system to support multiple schemas in multiple databases, migrate by using one of the following approaches. For each approach, use the `db_migrate` command or Database Harmony Profile tool.

- If there are no cross-database interactions, create a separate Db2 instance and BLUDB database for each Netezza database, and then migrate each Netezza database to one of the BLUDB databases.
- If there are cross-database interactions but no conflicting schemas across the databases, drop the database identifiers, and then migrate to a single Db2 instance and BLUDB database.
- If there are cross-database interactions and conflicting schemas across the databases, merge each database identifier and each schema into a single schema, and then migrate to a single Db2 instance and BLUDB database.

In each case, the schemas are moved to the BLUDB database when you migrate.

Case setting for identifiers

In a Db2 system, lowercase identifiers, such as for table names, are converted to uppercase. This is also the default behavior in a Netezza system. However, if you used the `nzinitssystem -lowercase` or `nzconvertsyscase` command to force the Netezza system to use lowercase ...

Time zone

Netezza uses UTC by default, but you might have configured Netezza to use a different time zone. The Db2 products also use UTC by default. If you require time stamps, times, or dates to use a different time zone, use the `TO_UTC_TIMESTAMP` or `TIMEZONE` function.

Encoding and collation

A Db2 system uses UTF-8 encoding with `IDENTITY` collation. A Netezza system uses Latin-9 encoding for single-byte characters and UTF-8 encoding for multibyte characters, with a default collation of `BINARY`. The differences between systems can result in data expansion when you load data and differences in how character data is ordered.



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INZA:

As there are many INZA function calls below are the ones that do not exist in any cross over functionality between Netezza and Db2 Warehouse.

Association rules

Verify_Arule

Classification

Cross_validation
Percentage_split
train_test

Clustering

Divcluster
predict_divcluster
set_clustername

Data Transformation

PCA
Project_PCA

Model Management

metadata_analyze
migrate_exists

register_model Association rules

Verify_Arule

Classification

Cross_validation
Percentage_split
train_test

Clustering

Divcluster
predict_divcluster
set_clustername

Data Transformation

PCA
Project_PCA

Model Management

metadata_analyze
migrate_exists
register_model



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Probability Distributions

Cumulative

Quantiles and outliers

None

Regression

Print_glm

Sampling

None

Statistics

Bitable

All Manova tests

spearman_corr_S

Summary1000interval

t_pmd_test_s_agg

Unstable

Timeseries

None

Utilities

None



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SQL:

While Most SQL command are the same there are some that will not long be available in the Db2 Warehouse

ALTER:

- Aggregate
- Group
- Library
- Session
- User
- Views on

Drop

- Group
- User

Groom table

BEGIN

Commit

Create

- Aggregate
- Database
- Group
- History configuration
- Scheduler rule
- Schema
- User



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Rollback Transactions

Set (most parameters)

! Factorial operator

^ and ** exponential operators

#bitwise XOR operator

<< and >> bitwise left shift and right shift operators

System views and tables _v_, _vt_, _t_

Ampersand (&) in a column name

Underscore (_) as the string character

Note: most others are supported but may have different functionality and or limitations.



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Migration:

After understanding the compatibility between your current jobs and structure we can move to migrate the system to the Db2 Warehouse.

Process:

1. [Plan your migration.](#)
2. Acquire your system:
 - IBM provisions the Db2 managed service environment. For information, see the [IBM Bluemix®](#) page.
 - You provision your own Db2 Warehouse environment. For information, see [Deploying Db2 Warehouse](#).
3. Create database objects, such as tables. You do not need to create the Db2 database itself; it is created for you. To create database objects, execute the converted DDL on the web console Analytics or Run SQL tab, or use another command-line interface.
4. Move your data. For the Db2 managed service, use [IBM BlueMix Lift](#). When you use BlueMix Lift, you can set up processes to keep the moved data synchronized with the source during the activities in the following steps. For Db2 Warehouse, use the `db_migrate` command; see [Moving data using db_migrate](#).
5. Migrate your users, groups and security configuration. For more information, see [Security](#).
6. [Map your system views.](#)
7. [Migrate your queries.](#)
8. [Migrate your routines.](#)
9. [Migrate user-defined extensions.](#) See [IBM PureData System for Analytics \(Netezza\) and Db2 user-defined extensions compatibility](#), [Deploying R](#), and [Installing Python packages](#).
10. Redirect users and applications to the Db2 database. For example, change drivers or BI tools to point to the database.
11. [Validate your migration.](#)



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Moving your data:

Method: *db_migrate*

Syntax:

```
db_migrate -shost NPS_host -suser NPS_user  
-spassword password -sdb NZDB -tuser dashUser  
-tpassword dashPword -tdb BLUDB -t tabName  
-createtargettable yes -truncatetargettable yes
```

For multi-schema:

1. db_migrate

```
-sdb D1 -shost 9.167.40.76 -suser admin -spassword **** -sschema S1  
-tdb BLUDB -tuser db_user -tpassword ***** -tschema D1_S1 -  
createTargetTable yes
```

2. db_migrate

```
-sdb D2 -shost 9.167.40.76 -suser admin -spassword **** -sschema S1  
-tdb BLUDB -tuser db_user -tpassword ***** -tschema D2_S1 -  
createTargetTable yes
```



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Migrate views

NETEZZA VIEW (all start with _v_)	Db2 WAREHOUSE equivalent
Aggregate	SYSCAT.ROUTINES
Environ	SYSIBMADM.ENV_INST_INFO
External	SYSCAT.EXTERNAL_TABLEOPTIONS



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Migrate views

NETEZZA VIEW (all start with _v_)	Db2 WAREHOUSE equivalent
EXTOBJECT	SYSCAT.TABLES
FUNCTION, PROCEDURE	SYSCAT.ROUTINES
RELATION_COLUMN, RELATION_COLUMN_DEF, SYS_COLUMNS	SYSCAT.COLUMNS



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Migrate views

NETEZZA VIEW (all start with _v_)	Db2 WAREHOUSE equivalent
SCHEMA, TABLE, SYNONYM	SYSCAT.SCHEMAMATA
STATISTC, TABLE, SYNONYM	SYSCAT.TABLES
SYS_DATATYPE	SYSCAT.DATATYPES
VIEW	SYSCAT.VIEW



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Migrate Queries:

Use one of the following approaches:

- If your query was generated by a third-party tool, re-create the query by selecting the Db2 connector option in the tool.
- If your query was not generated by a third-party tool, perform the following steps:
 - a. Evaluate compatibility by using the Database Conversion Workbench or Database Harmony Profiler. For information about how to obtain and use these tools, see the [Database Conversion Workbench page](#) and [IBM Database Conversion Workbench \(DCW\)](#) topic.
 - b. If the tool flags incompatibilities that it cannot fix, manually fix them.
 - c. Automatically fix the remaining incompatibilities by running the Database Conversion Workbench or Database Harmony Profiler again.

Migrate Routines:

If you are moving from Netezza to Db2, you might want to permanently change your NZPLSQL source code to SQL PL, as described in the following procedure. You can then take advantage of any future SQL PL enhancements. However, if you do not want to permanently change your code, you can set the SQL_COMPAT global variable to 'NPS' before you compile your NZPLSQL source in Db2. The routine is then sent to an NZPLSQL cross-compiler, which attempts to convert the routine from NZPLSQL to SQL PL before sending it to the SQL PL compiler. Some manual changes might still be needed.

1. Evaluate compatibility by using the Database Conversion Workbench or Database Harmony Profiler. For information about how to obtain and use these tools, see the [Database Conversion Workbench page](#) and [IBM Database Conversion Workbench \(DCW\)](#) topic.
2. If the tool flags NZPLSQL code that it cannot convert to SQL PL, manually change the code.
3. Automatically convert the remaining code to SQL PL by running the Database Conversion Workbench or Database Harmony Profiler again.



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VALIDATION:

Procedure:

Perform the following steps:

- Ensure that your Netezza and Db2 objects are comparable, based on the conversions that you performed by using the Database Conversion Workbench or Database Harmony Profiler or by making manual changes.
- Test applications that contain converted SQL, such as by using the web console. Ensure that the results for your Netezza workloads and Db2 workloads are equivalent. Ensure that the performance of your Netezza workloads and the performance of your Db2 workloads are comparable.



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Db2 Warehouse &
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IBM Fix Central: <https://www.ibm.com/support/fixcentral/>
DB2WH & IAS Support Page: http://ibm.biz/pda_support
IBM Knowledge Center http://ibm.biz/pda_knowledgecenter



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LIVE DEMO



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<http://www.ibm.com/software/data/puredata/analytics/system/>

Db2 Warehouse

<https://www.ibm.com/us-en/marketplace/db2-warehouse>

IBM Integrated Analytics System

<https://www.ibm.com/us-en/marketplace/integrated-analytics-system>

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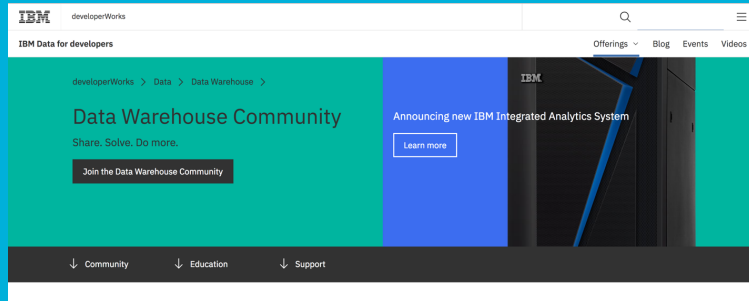
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